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Freeway Capping: Capping Nashville's I-40 South Loop to Connect Downtown and Midtown

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To the Graduate Council:

I am submitting herewith a thesis written by Michael Joel Payne entitled "Freeway Capping: Capping Nashville's I-40 South Loop to Connect Downtown and Midtown." I have examined the final electronic copy of this thesis for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Master of Landscape Architecture, with a major in Landscape Architecture.

Sam M. Rogers, Major Professor

We have read this thesis and recommend its acceptance:

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(Original signatures are on file with official student records.)

Freeway Capping: Capping Nashville's I-40 South Loop to Connect Downtown and Midtown

A Thesis Presented for the
Master of Landscape
Architecture
Degree
The University of Tennessee,
Knoxville

Michael J. Payne
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DEDICATION

I dedicate this work to the MLA Class of 2012. Best of luck to all of us.

ACKNOWLEDGEMENTS

Thanks to Ken McCown for all your help throughout the semester. Your guidance and encouragement was invaluable. Thanks also to Ted Shelton, T.K. Davis, and Sam Rogers for your contribution throughout the semester. In addition, thanks to Ron Yearwood, Gary Gaston and all the fine folks at the Nashville Civic Design Center for introducing me to this idea and supporting me throughout the exploration. Thanks to Peter Harnik at the Center for City Parks Excellence for sharing their research on highway parks.

ABSTRACT

In 1956, the U.S. federal government enacted the Federal Highway Act, and the interstate system would change the face of cities across the nation. (Weingroff, 1996) These highways were great opportunities to rapidly bring people to and from the city (Kreyling, 2005). While the interstate system does serve an important transportation role in today's automobile reliant economy, it also functions as a great divider of the urban fabric in many cities. During the planning of the interstates, many people argued that they should not run through cities. They argued that the highways would divide neighborhoods, bring unwanted pollution and noise, and increase vehicular congestion (Halprin, 1968).

Today, interstate highways run through most metropolitan areas. It is rare that highways can be removed. Many cities build deck parks over highways to reconnect the urban fabric, increase public green space, reduce unwanted noise, and to help encourage further development, but is this method of using landscape infrastructure to cover transportation infrastructure effective in achieving these goals? By using Nashville as a case study, I seek to understand how a deck park could serve as a connection between urban districts. I will use precedent studies in existing and proposed deck parks over highways to further understand how these parks are achieving these goals. I will also plan for and design a park to stitch connectivity through program elements.

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CHAPTER I
BACKGROUND KNOWLEDGE

Overview of Deck Parks

A deck park is a park that exists over a highway by “capping” or “decking” the highway. Deck parks are also referred to as lid parks, cap parks, or bridge parks (Harnik, 2010). The idea of building a park over a freeway goes back as early as 1939, when Robert Moses built Carl Shurz Park on top of the Franklin D. Roosevelt Highway in New York City. This early deck park is shown in Figure 1 as it decks the highway shown in red. The construction of the highway made access to the riverfront impossible. By burying the highway for a .3 mile long section, Manhattan residents now have access to the waterfront. The access comes from the nearly 15 acre deck park

In 1976,Seattle’s Freeway Park opened to the public. Interstate 5 divided Seattle’s downtown and the historically residential First Hill neighborhood, much to the dismay of Seattle’s environmentally oriented populace. The interstate was originally built below grade, making the construction of the deck easier. Today, Freeway Park connects Seattle’s downtown and the First Hill neighborhood (Halprin, 2007).

Today, there are 24 of these parks built in the United States with at least 12 more in the planning process. These parks vary in size. According to a study by the Center for City Park Excellence in 2007, the average size of today's deck park is about 8 acres covering about 1,600 linear feet of highway (Harnik, 2010).

In most cases, the main purpose of building a deck park over a highway is to connect two important areas in a city. This purpose may be connecting a downtown to its riverfront. This was the case with Trenton, New Jersey's Riverwalk Plaza (Figure 1.1) which connected the city to the Delaware River (Harnik, 2010). In other cases, the connection may happen between two parts of town or neighborhoods. Such was the case of Klyde Warren Park in Dallas. The parks purpose was to connect Dallas's downtown to the arts district (ThePark, 2010). The purpose of Phoenix's Hance Park was similar in connecting the city's

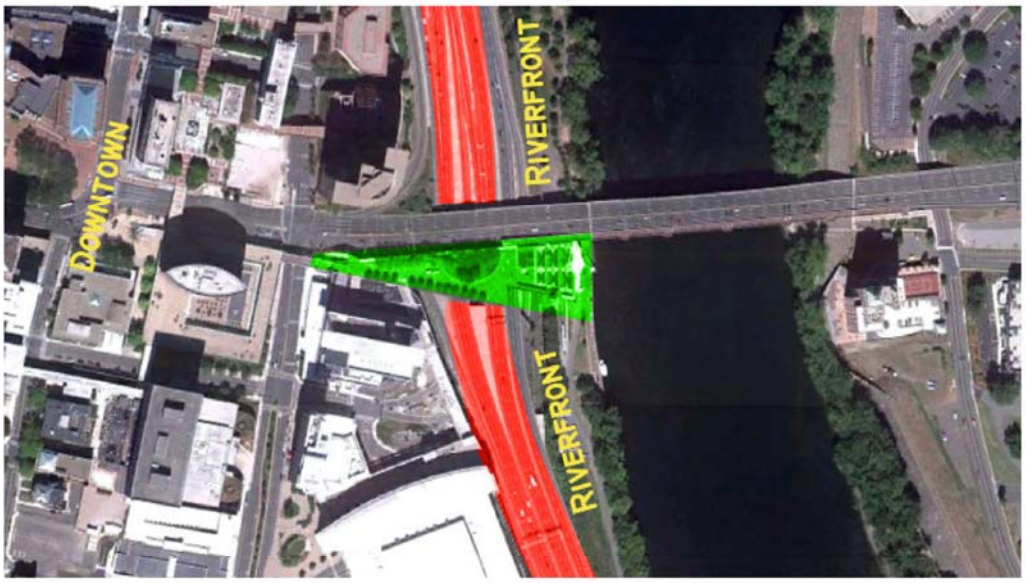


Figure 1.1 Riverwalk Plaza(2012) Source: Michael Payne - Background Image: Google Earth

uptown and downtown.

As shown in the previous figures, these parks vary greatly in size. They can be as small as Hartford Connecticut's Riverwalk Plaza at 1.5 acres. They can also be as large as Carl Schurz Park at 14.9 acres. The largest deck park in the United States to date is the Rose Kennedy Greenway or 'The Big Dig' in Boston which is 30 acres in size and covers 5,280 linear feet of highway (Harnik, 2010).

Selected Site, Nashville, TN

I selected a site in Nashville, Tennessee, based on the division created by the interstate, the heavy urban presence around the interstate, the importance of the site to the city, the sites suitability to decking and my personal involvement to the site. The site is four blocks in length along Interstate 40 and extends in each direction about 1 block. The area of the deck park totals about 16 acres with the acreage of the entire site exceeding 100 acres (Figure 1.2).

The Presence of a Void – Border Vacuums

In her book *The Life and Death of Great American Cities*, Jane Jacobs's discusses the concept of 'border vacuums', referring to large, single use swaths

of land typically creating borders between themselves and the rest of the 'ordinary city'. These borders usually suck the life out of the areas of the 'ordinary city' with which they border. Some examples given include large housing projects, waterways, railroads, highways and even parks.

The most relevant example given by Jacobs to this Nashville site is the railroad. Much like the railroad, the interstate can only be crossed at designated crossings or bridges. It causes dead ends at the streets that may have crossed it before. It brings noise and pollution. Any activity that may have taken place before its presence is gradually sucked away. That activity usually retreats from the borders and back into the "ordinary city".

The construction of I-40 in Nashville has certainly caused a border

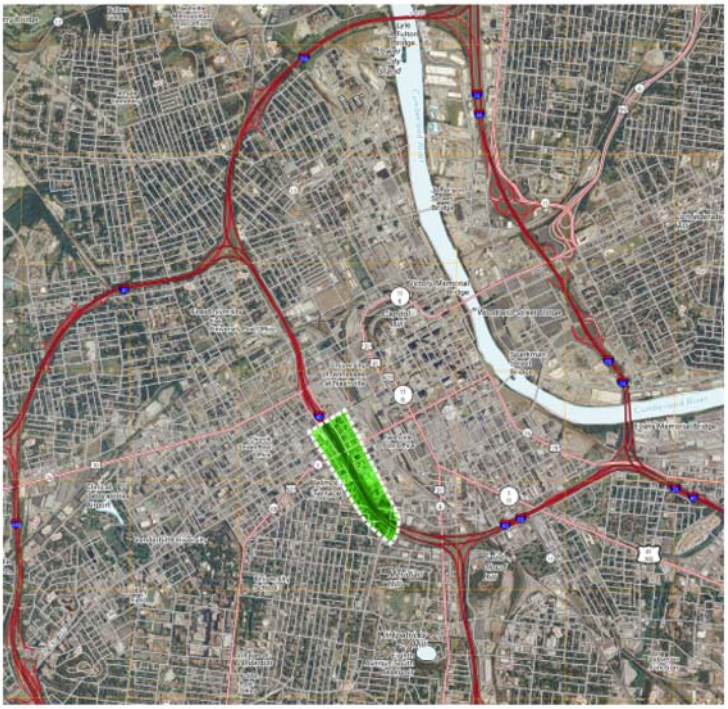


Figure 1.2: Selected Site (2012) Source: Michael Payne - Image Background: Google Maps

vacuum. The area between downtown and midtown has become an area of blight. This void separates two great Nashville neighborhoods. This separation is shown in Figure 1.3.

Figure 1.4 shows this void caused by the border vacuums in more detail. The void is caused by two border vacuums. One is the interstate and the other is the rail line. This would prove to be important information when locating residential buildings. While the border vacuum has been addressed by the deck park, the border vacuum caused by the rail line has not. The interstate deck has the potential to become the centerpiece of the neighborhood.

Heavy Urban Interstate Presence

Nashville has a large urban interstate presence. There are three interstates that run through the city, as well as peripheral limited access loops that circle the city. The main concerns with this project are the interstates that circle downtown. They are I-40 and I-24 running East and West and I-65 running North and South. Together these interstates circle the downtown area, as shown in Figure 1.5.

Figure 1.3: Diagram - Void Between Midtown and Downtown (2012) Source: Michael Payne - Image Background: Google Earth

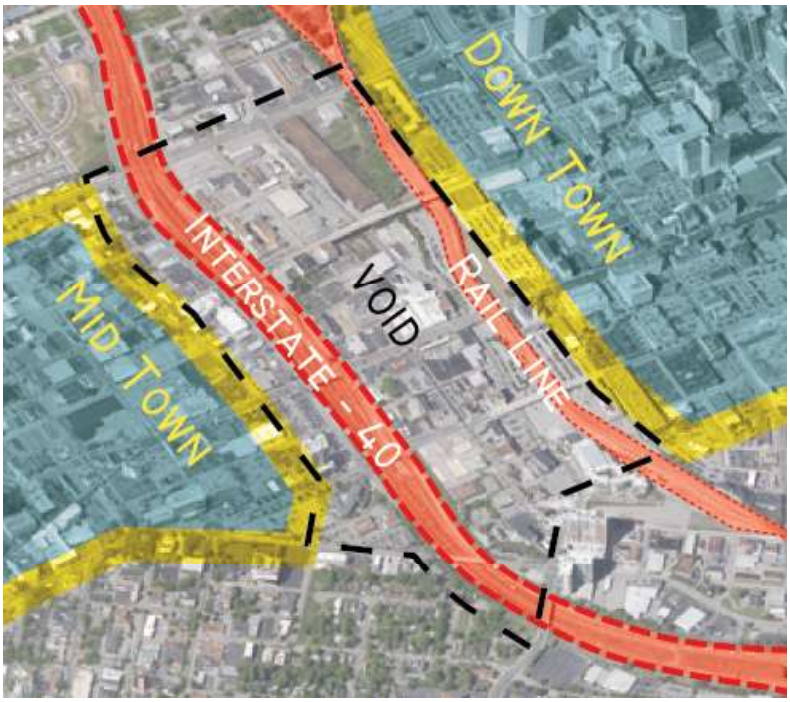


Figure 1.4: Diagram - Border Vacuum (2012) Source: Michael Payne - Image Background: Google Earth

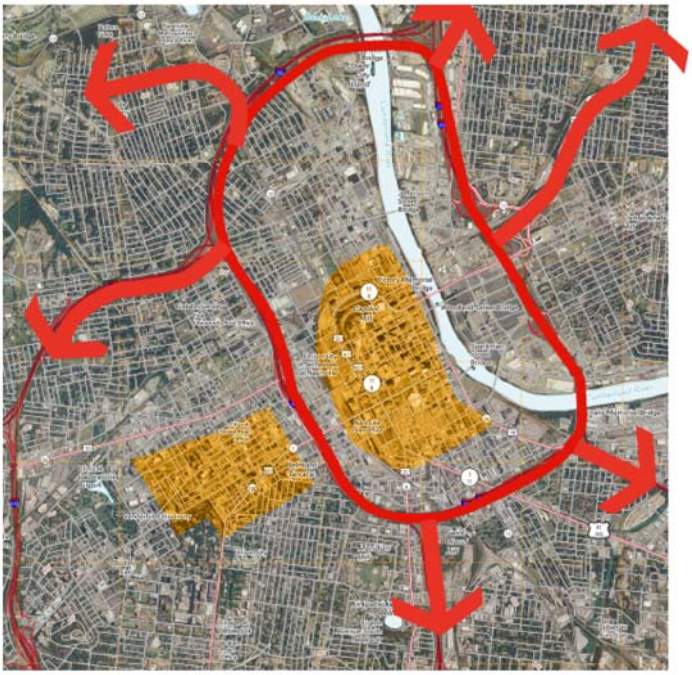


Figure 1.5: Site and Nashville Interstate Loop (2012) Source: Michael Payne - Background Image: Google Maps

Importance of the Site – The East/West Corridor

Many cities have a main corridor that runs through the center of the city. For Nashville, that corridor is the Broadway and West End corridor (Figure 1.6). According to a study by the Nashville Metropolitan Transit Authority, this is the most important corridor in the city. The study reads,

> "The East West Connector serves as the region's Main Street. More than any other corridor in the area, it brings together universities, hospitals, businesses, tourist and cultural attractions, key residential areas and centers of federal, state and local government. From St. Thomas Hospital to LP Field, from Vanderbilt University to the honky

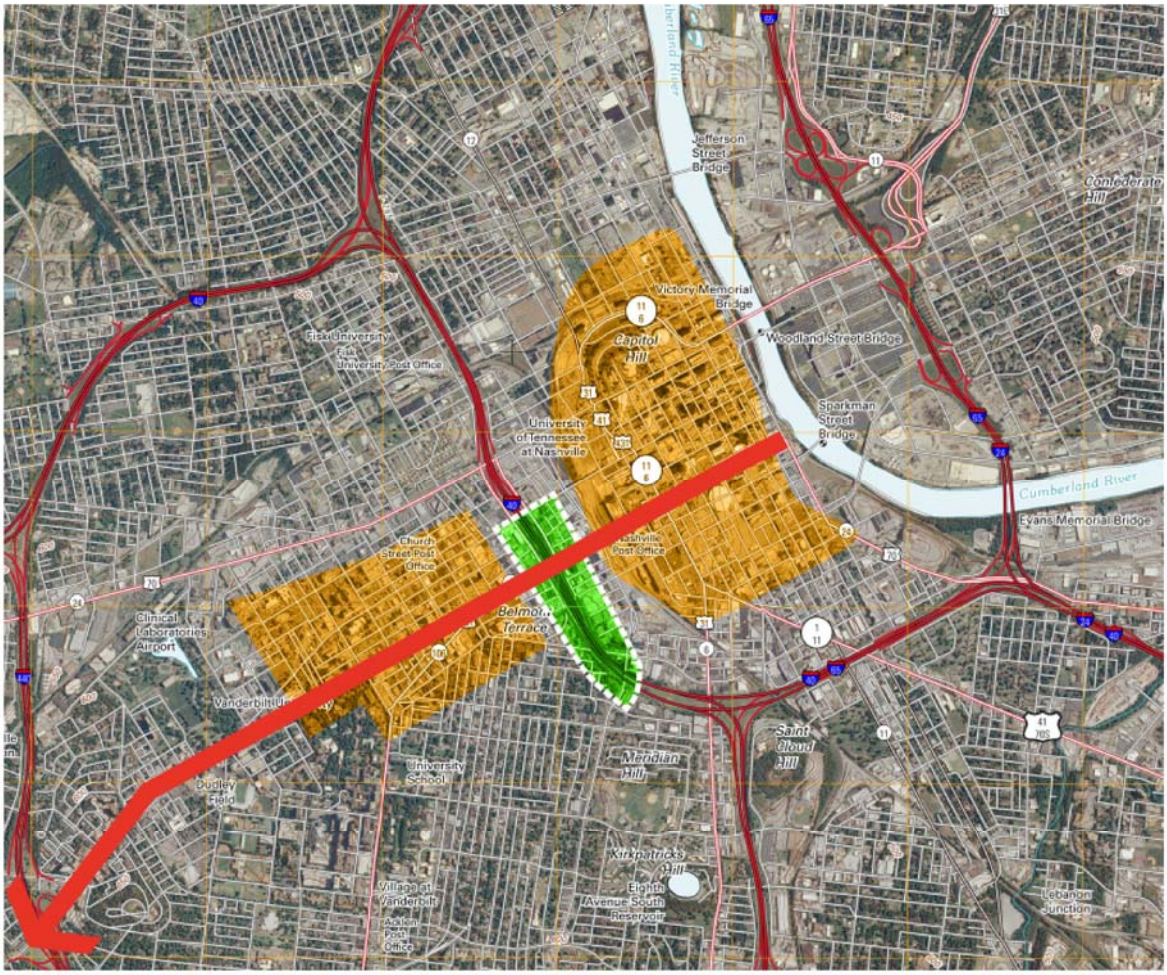


Figure 1.6: Site and Broadway West End Corridor (2012) Source: Michael Payne - Background Image: Google Maps

> tonks of Lower Broadway, everyone in the region has a reason to use this vital corridor" (Broadway/West End Corridor Study, 2012).

These elements are shown in figure 1.7. In order to warrant the construction of a deck park, the site must be considered important to the city. It is clear that this site is of great importance and is in a prime location for Nashville.

Suitability of the Site to Decking

Another reason for selecting this site is that the existing interstate is already below grade for four blocks (Figure 1.8). This makes the possibility of minimizing the effects of the interstate upon the city through the implementation of a deck park and connecting previously severed districts a very real one.

Figure 1.7: Important Landmarks Along East/West Corridor (2012) Source: East/ West Corridor Study

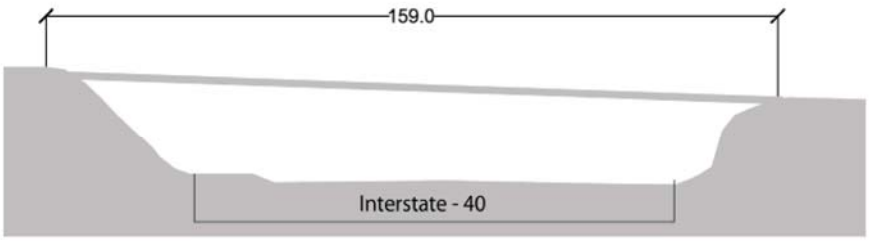


Figure 1.8: Interstate Cross Section through Site (2012) Source: Michael Payne

Deck parks are inherently expensive. Much of the expense comes from the transportation infrastructure involved with moving the existing highway underground. This was the case with Boston's Rose Kennedy Greenway or 'Big Dig'. However, of the projects $14 billion cost, only about $40 million were attributed to the four parks overhead. Some of the infrastructure expense can often be covered by Federal funds (Harnik, 2010). The ratio between the cost of the park and the cost of the transportation infrastructure vary greatly from project to project.

Sites where the interstate is already below grade greatly reduce the overall cost of the project (Harnik, 2010). This was the case in Dallas's Klyde Warren Park (ThePark, 2010). With the interstate already below grade, the demolition and reconstruction of the highway as well as the expense that comes with it are avoided. However, the cost of building the structure to support the park is still considerable (Harnik, 2010).

Personal Involvement with the Site

The final reason I selected Nashville as a site for this project is because it is my hometown. As a designer, it is very rewarding to propose new ideas in a place where one is raised. While interning with the Nashville Civic Design Center last summer, I learned about some of the issues Nashville will face as it continues to grow. Three of these issues are transportation, a lack of open space near the urban core, and the moat of concrete and traffic surrounding the downtown (Kreyling, 2005). It is my hope that this project will demonstrate how to address these issues in my hometown.

Existing Quality of the Site

The area surrounding the interstate has become a border vacuum. Pedestrians traveling between midtown and downtown are at a disadvantage due to the narrow sidewalks and heavy presence of automobile traffic, both along the sidewalks and on the interstates below. In addition, there are cars exiting and entering the interstate throughout the site. These interstate ramps will also bring design challenges in decking the interstate. There are vacant buildings and empty lots. Cross streets dead end into fences that prevent access to the interstate. All together, this makes for an overall void site. This condition is very

similar to the border vacuums described by Jane Jacobs.

Nashville History

In Nashville, the main river is the Cumberland, which makes a serpentine path through the city. The river was the principal lifeline to the rest of the world. It connected Nashville to the Ohio, Tennessee, and Mississippi Rivers (Kreyling 2005). It was Nashville's original transportation source. "The chain of hills or knobs that encircles the city shaped the underlying structure of Nashville's historic pikes and railroad tracks, which follow the path of least resistance first traveled by bison and the natives who hunted them."(Kreyling 2005) The land division, however, was not treated with much geographical consideration, as was common with many cities. The grid system used by National Land Survey of 1785 was used for the division of the land. It gave no concern to the rolling hills or hydrology of the region.

In 1859, the Louisville & Nashville (L&N) railroad arrived in Nashville, and would serve as the primary mode of shipping to and from the city, taking place of steamboats on the river. "The routes the railroads followed into and through the city were predictable: the bottomlands and ravines that were unsuitable for other development." (Kreyling, 2005) This condition is shown in Figure 1.9. Even this early, the strong east-west corridor is evident.

As logging and industry grew, the city sprawled. Initial sprawl went west

Figure 1.9: Map (1868) Source: USGS - Development Diagram: Michael Payne

to be upwind from the menacing odor and soot of industry. By the late 1800's the city had sprawled in all directions with the construction of more bridges and the use of horse and buggy as transportation. "This animal-powered transit provided reliable service up to roughly two miles from the city center." (Kreyling 2005)

With sprawl came the need for open green spaces. In the late 19th century, the city did have some open spaces. They were mostly cemeteries, with the exception of Watkins Grove (Watkins Park Today).

> "But real estate developers learned in the 1880's that setting aside part of their subdivision plat for green space stimulated sales of the surrounding lots and enhanced overall land values. Because these developers were frequently also principals in the streetcar lines, they located "trolley parks" at the end of the routes to increase traffic on the lines during the weekends and to showcase the real estate for sale along them." (Kreyling 2005)

If this technique of using parks was successful in attracting buyers out of the city, perhaps it could be successful in bringing people back into the city over 100 years later.

Though the original purpose of these parks was as a sales tool to draw people out to the suburbs, they helped promote the use of electric trolley cars as a primary mode of early mass transit. The trolley system marked the infancy of sprawl in Nashville. A map and diagram of this system is shown in Figure 1.13.

The trolley system established a demand for public municipal parks, and in 1901, the Parks Board was founded. The Parks Board formed a plan for four city parks, one in each quadrant of the city. Each was at least 50 acres in size. This included Centennial Park to the west, Hadley Park to the north, Shelby Park to the East, and a handful of smaller parks to the South (due to pressure

Figure 1.10: Trolley Map (1927) Source: Wagner's Complete Pocket Map of Nashville - Development Diagram: Michael Payne (2012)

for industry and the inability to find a large site). This was a sign that rural lands around Nashville were already vanishing and that the city needed to set aside land for recreation and social health.(Kreyling, 2005) Today it has become even more difficult to secure large parcels of urban land for parks because of the high value of the land. This high cost of land is one of the reasons that deck parks have become popular. The land on which they are built is essentially free. It is made available through air rights by the state transportation agency. (Harnik, 2010)

The 1920's brought on the rise in popularity of the automobile. As the automobile became more available to the public the city changed drastically. Neighborhood locations relied less on proximity to trolley lines and distance from town became less of an issue. The trolleys eventually went out of service under the popularity of the personal automobile and were later replaced by buses. The historic pikes became increasingly commercialized with low-density development."(Kreyling 2005) This broke the pedestrian connectivity that had previously existed in the city. This condition is shown in Figure 1.11.

In addition, the sudden increase in automobiles created a need for parking, erecting garages and requiring the need for on street parking. The streets were becoming unsafe for pedestrians. Broadway and West End Avenue became what was called in *The Tennessean* an "Auto Row". Old mansions were displaced by automobile showrooms, a result that is still apparent today (Kreyling, 2005). As people continued to move out of the city, the city was becoming more disconnected.

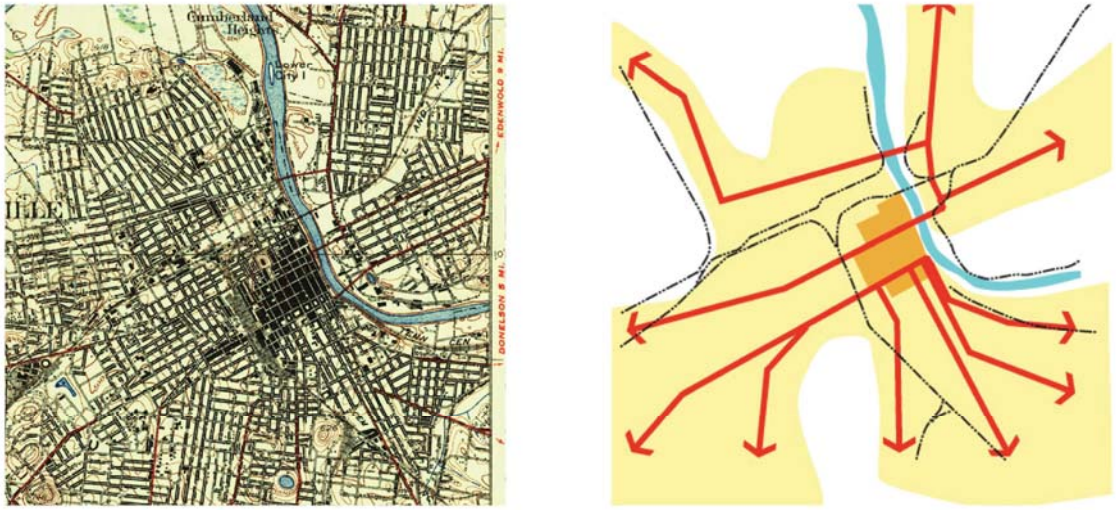


Figure 1.11: Nashville Street Map (1932) Source: USGS - Development Diagram: Michael Payne (2012)

The stock market crash of 1929 was felt in Nashville with the closure of over 120 banks across the south. Unemployment in Nashville went up to 25%. This is an enormous amount compared to the current recession of 8.8%. This 25% unemployment was largely experienced by the construction industry. (U.S. Bureau of Labor Statistics) The result was an increase in Federal funding for the improvement of Nashville's built environment. Between 1934 and 1940, the city built a new downtown post office (now the Frist), courthouse, city market, two new housing projects and eight new schools. In addition, Federal dollars went to improving the parks system, including the addition of a golf course, a picnic shelter, miles of limestone walls, and a steeplechase to the Warner Parks. The Tennessee Valley Authority (TVA) brought more affordable electricity to the area. Streets were improved and widened to make way for yet another automobile

boom after WWII.(Kreyling, 2005)

1962 brought the arrival of the interstate system in Nashville, beginning with I-40. “City officials across the nation reasoned that the highways would deliver tourists as well as the trucks that were supplanting trains as the carriers of goods, and make commuting easier for the suburbanite crawling on the arterials.” (Kreyling 2005) The interstates were being asked to facilitate both local traffic and through traffic. To do this, the number of access points were increased (Kreyling, 2005). This marked the beginning of urban sprawl as we know it today. This condition can be seen in Figure 1.12. The interstate encircles the city. Not only did it enable more people to move away from the city and make the daily commute into Nashville, it would also create a disconnect between the downtown and its neighboring districts.

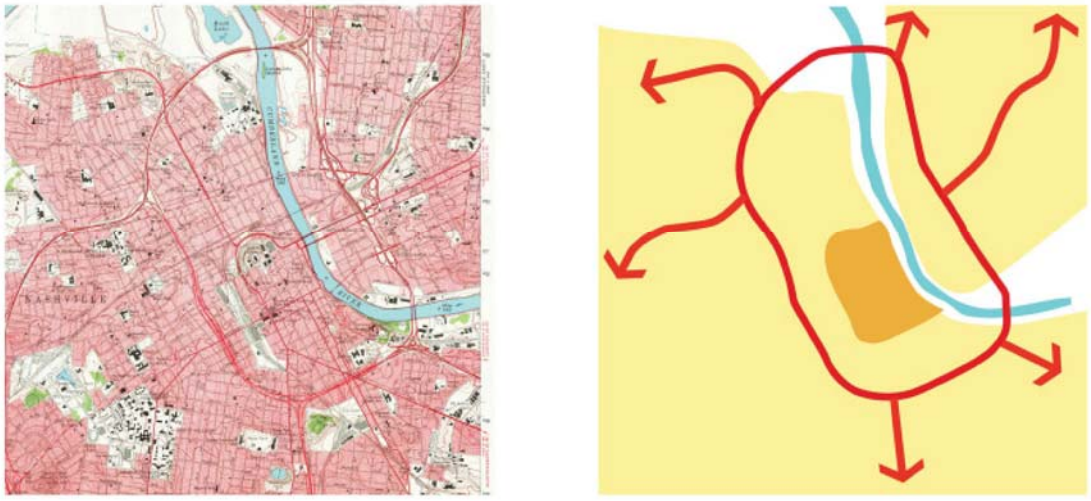


Figure 1.12: 1968 Nashville Street Map (1968) Source: USGS - Development Diagram: Michael Payne (2012)

Nashville Present and Future

Nashville Today

Today, the interstate system is becoming increasingly congested. Since the implementation of the interstate system in Nashville, commuting times continue to increase as employees working in Nashville continue to move further from town. Dense development has continued to expand West as it has historically. There is a disconnect in this development along the interstate. This condition is shown in Figure 1.13.

We are beginning to see this condition reverse. Over the past two decades, Nashville has had a renaissance in the downtown area. Some

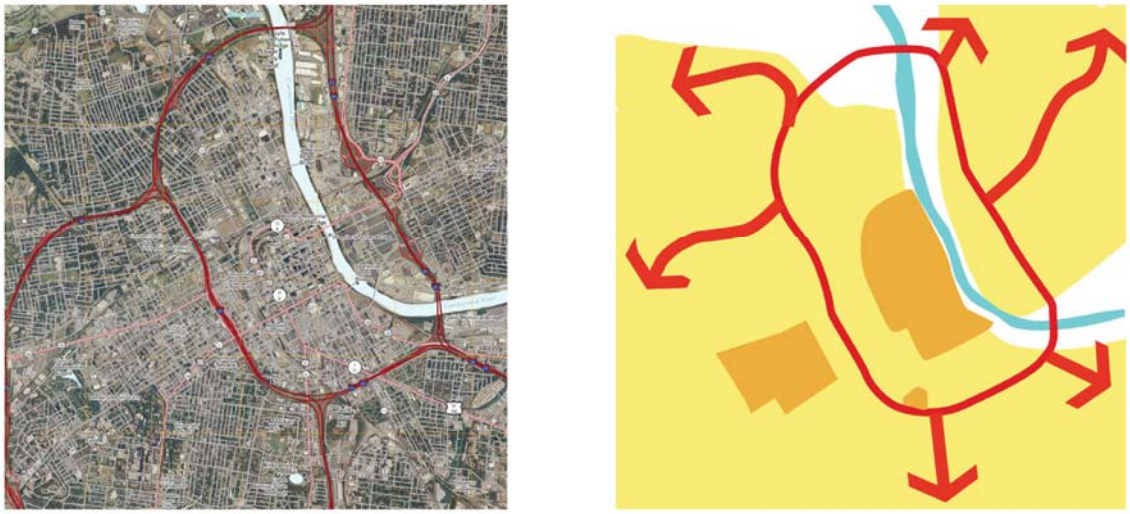


Figure 1.13: 2012 Nashville Street Map (2012) Source: Google Maps - Development Diagram : Michael Payne (2012)

examples include the reopening of the Ryman Auditorium, the renewal of Second Avenue and Lower Broadway, the opening of the Frist Center for the Visual Arts, the construction of the Bridgestone Arena and LP Field to name a few. Most recently, the city began construction on the Music City Center, a new convention center downtown which is working to achieve LEED Silver accreditation. (Nashville Music City Center, 2010) Softer zoning codes have led to an increase in lofts and apartments; but a majority of Nashvillians still make the daily commute, crawling along the interstate in automobiles (Kreyling, 2005).

Nashville Tomorrow

If the future does in fact hold in increase in urban living, the question is, where will this development happen. My analysis has shown that the most dense development has historically and will likely continue along the Broadway East/ West corridor. The East/West Corridor study discussed before supports this. My analysis also shows that there is a border vacuum along this corridor due to the presence of the interstate. Rather than continue to move West along the corridor, my vision calls for an expansion of the urban core. By filling the void created by the interstate, downtown and midtown can be united by a new neighborhood, as shown in Figure 1.14.

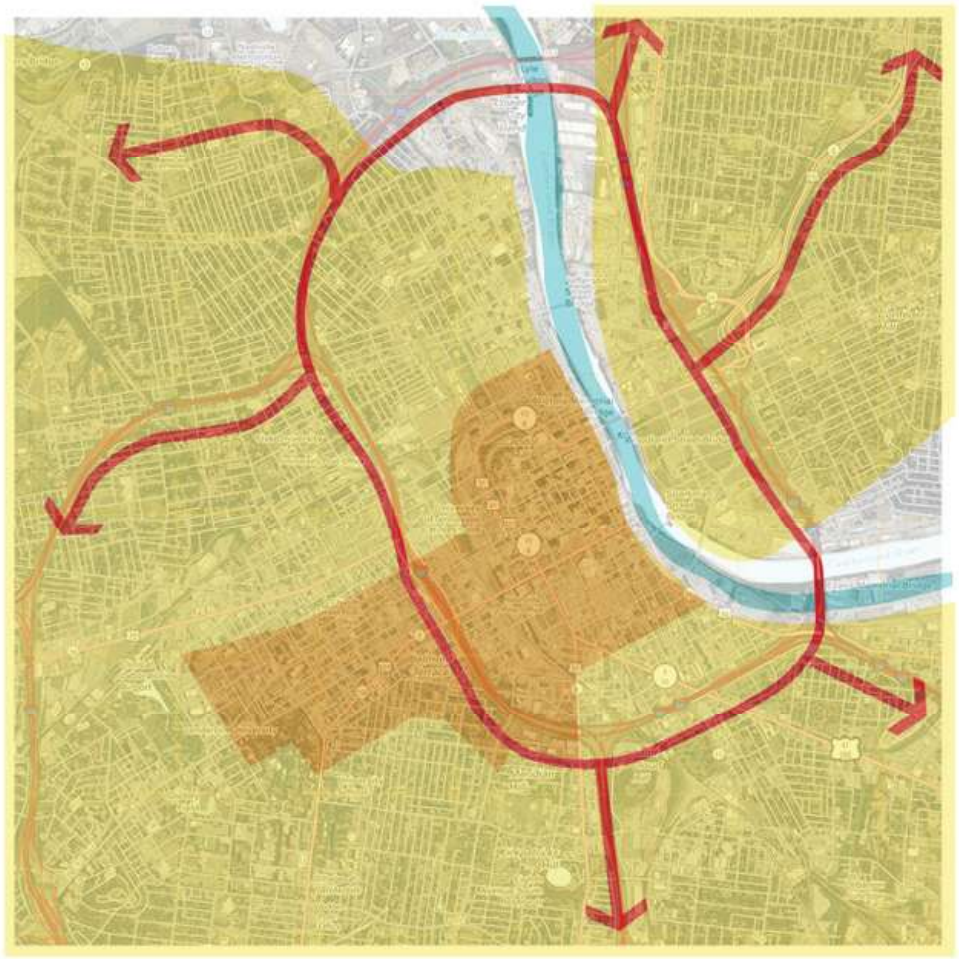


Figure 1.14: Diagram, Nashville Future Development (2012) Source: Michael Payne - Background Image: Google Maps

Connectivity

My thesis question is as follows. “Are parks built over highways successful in connecting severed neighborhoods?” A large part of this project concerns connectivity. What is connectivity? Precedent studies like the recently named Klyde Warren Park in Dallas literally provide pedestrian access along all borders. It is not hindered by interstate ramps like the selected site in Nashville. These ramps prevent pedestrian connections. Pedestrian entrance to a majority of the proposed park is limited to the corners along the cross streets.

So if this park does not reconnect the urban fabric then what is it reconnecting? Is it simply making the narrow sidewalks flanking the cross streets over the interstate safer and more accessible for pedestrians? I do believe that wider sidewalks and separation from vehicular traffic will be a positive improvement, but I think there is more. I think connectivity goes further than reconnecting roads and providing pedestrian access over the interstate.

The area between midtown and downtown, the area around the interstate, is void. Midtown is active. Downtown is active. The Gulch, a new mixed use development near the site, is becoming more active. In between there is nothing. Perhaps connectivity is about taking a part of town that is void due to the presence of the interstate and making it usable. I think it’s more about filling a void in Nashville than it is about a physical connection like a bridge. This park, by covering the interstate and providing the open space that is necessary to make urban living truly attractive to residents, will fill the void and activate a gap in the

city with a new connecting neighborhood.

Connectivity and Parks

In order to activate the void between midtown and downtown, the implementation of the park is the first step. The addition of the park will reduce the negative effects of the interstate. The next step will be the construction of the mixed use buildings at the park fringes.

The neighborhood buildings and the park depend on each other to connect the void between midtown and downtown. The park will be vacant without the neighborhood around it. The neighborhood will never reach its potential without the available open space to give residents recreational opportunity. Further, visitors are less likely to visit a park that is largely unused. They are also less likely to visit a neighborhood that has few residents. Conversely, an important synergy can potentially develop over time with both park and neighborhood in place.

Connectivity through Multi-modal Transportation

Connectivity can also be achieved by multi-modal transportation. As stated before, the automobile is the primary mode of transportation in Nashville. The coming Bus Rapid Transit line along Broadway will help bring connectivity

between downtown and midtown. Connectivity will also be encouraged by improving the pedestrian mobility throughout the site. This will be achieved by widening sidewalks and adding street trees. Bicycle mobility will also be enhanced through the site by calming traffic. By providing opportunities for multi-modal transportation throughout and across the site, connectivity can be enhanced.

Other Master Plans

The Gulch

The condition is not all negative. On the Southeast end of the site is a mixed use residential development. This area is called the Gulch (Figure 1.15). According to Dirk Melton, development director for Market Street Enterprises, all of the residential buildings in the Gulch are over 90% full. (Lewis, 2012) This development proves that this type of residential mixed use development can be successful, not only in The Gulch, but also on the selected site. This success comes despite the fact that the nearest public park exceeding an acre in size is over a mile walk away.

The importance of nearby open space is a crucial component to downtown living. Donna Erickson writes about this importance in her book *Connecting*

Figure 1.15: Future Gulch Development, (N.D.) Note: Copyright Market Street Enterprises

Open Space in North American Cities. Erickson writes, “Claims from real estate research show that nearly 78 percent of all American homebuyers rated open space as essential or very important. Another national survey in 1994 found that among people who shopped for or bought a home, of thirty-nine features critical to their choice, consumers ranked ‘lots of natural open space’ and plenty of ‘walking and biking paths’ as the second- and third-highest-rated aspects affecting their choices”.

The development that currently exists in the Gulch is only partially complete. It is part of a larger master plan. This plan is shown in Figure 1.16. As you can see, the area planned for the Gulch extends along the East side of the I - 40.

The Gulch would potentially benefit tremendously from the addition a deck park over the interstate. The park could become the catalyst to creating a new neighborhood in Nashville and making the connection between downtown and midtown.

Previous Student Work

The site was also visited by a student in the Fall of 2011. Erin Gray, an architecture student from the University of Tennessee developed a master plan (Figure 1.17). Her master plan included the buildings from The Gulch Master Plan and retained much of the existing street system. This plan focused more on the urban design aspect of the project and served as a good starting point for my

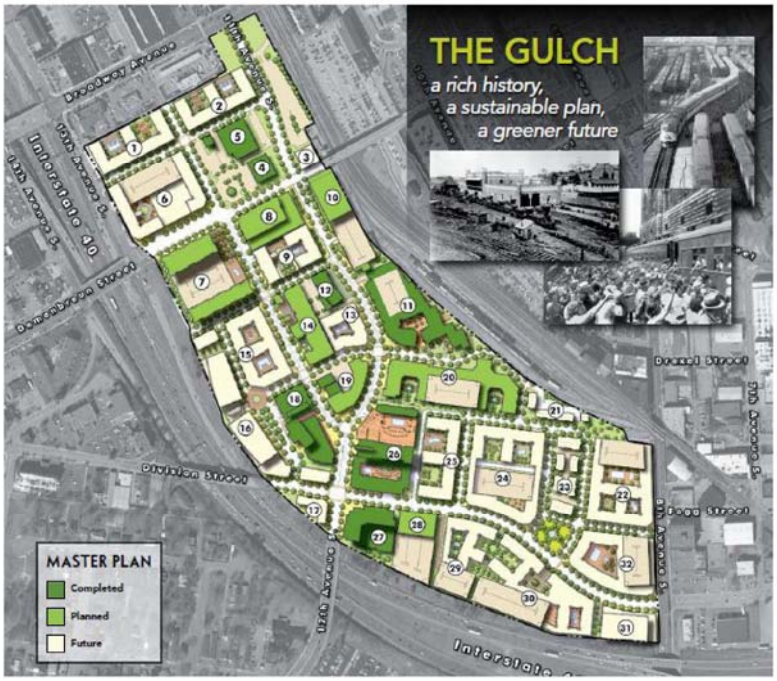


Figure 1.16: The Gulch Master Plan (N.D.) Note: Copyright MarketStreet Enterprises

Figure 1.17: Park and Master Plan (2011) Source: Erin Gray

master plan.

Structural Requirements

While the purpose of this project was not to address the structure of the deck, I knew it was important to have a good understanding of the structure. It would be necessary to know the thickness of the beams in order to calculate clearance below and soil depth above the deck. Soil depth is important because it will dictate where tree plantings are possible. Trees are important in a park because they provide shade, visual interest and wildlife habitat.

I started by referring back to my precedent studies. Klyde Warren Park in Dallas offered good insight into the construction process. Since the park was being built while I was studying it, I was able to keep up with it during the construction process. Figure 1.18 is an aerial image of the beam spanning the interstate during the construction of one of the decks. Although I did not select the box girder approach, I did take note of the vertical walls that support the beams.

The Hollywood Freeway Central Park Feasibility Study also offered some good insight on possible structural options. In the report, both a box girder structure and a bulb T girder structure were considered (Figure 1.19).

In order to get the thickness of the structure, I looked at the Neyland

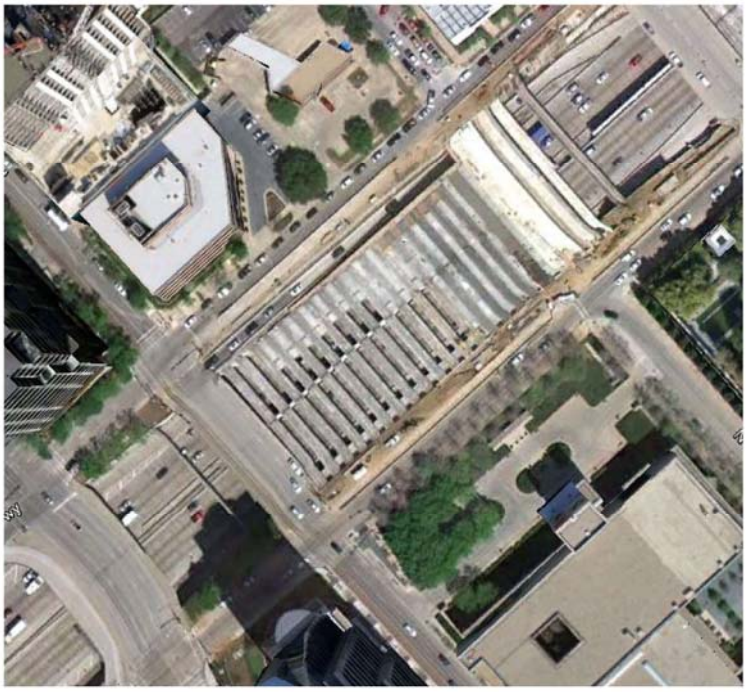


Figure 1.18: Klyde Warren Park Construction (2012) Source: Google Earth

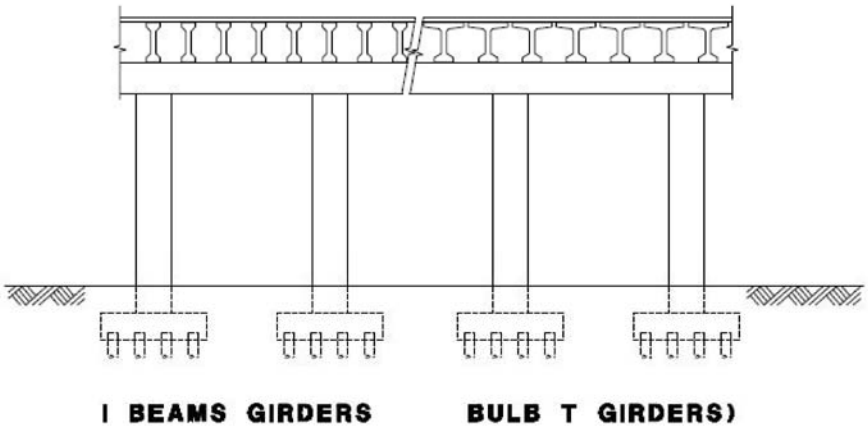


Figure 1.19: Typical Section for PC/PS I or Bulb T Girder Structure (2008) Source: HFCP Feasibility Report

Parking Garage on the Campus of the University of Tennessee in Knoxville. I chose this garage because the span of the garage was similar to the span of the interstate. The joists were 24" thick. I planned on 36" of thickness to compensate for any discrepancy in the topographical map. In time, a more in depth structural analysis would be mandatory.

CHAPTER II
METHOD

Research and Analysis

I began by researching the site. I looked at the surrounding parks and demographics. I then began to analyze the site. This involved making site visits and conducting a photo survey. There was also a physical analysis of the site. This included modeling the site and analyzing the site in section view. A topographical analysis was also conducted in plan view.

Research

Existing Parks and Programming

In order to activate the neighborhood and achieve connectivity, the park will need to be heavily used. In order for the park to be heavily used, it will need to meet the needs of the city. As part of my analysis of the context surrounding the site, I conducted a study of the surrounding parks on the site. I conducted

this study by studying maps to pinpoint the locations of existing Nashville parks. I then conducted research on each park to find out what kind of amenities each park offered. My study revealed that there is currently not a park within a half a mile of the site. The study revealed a diagram that shows the results (Figure 2.1). The diagram allowed me to visually understand where the different parks are located in Nashville as well as the recreational activities each provides.

Neighborhood Demographics and Context

After gaining an understanding of the existing parks in and around Nashville, I looked at the neighborhoods that the park would serve. Census tracts were not detailed enough to analyze different sections of the park. I used a neighborhood analysis along with the surrounding context of the park to drive programming needs for the park. Figure 2.2 shows this analysis.

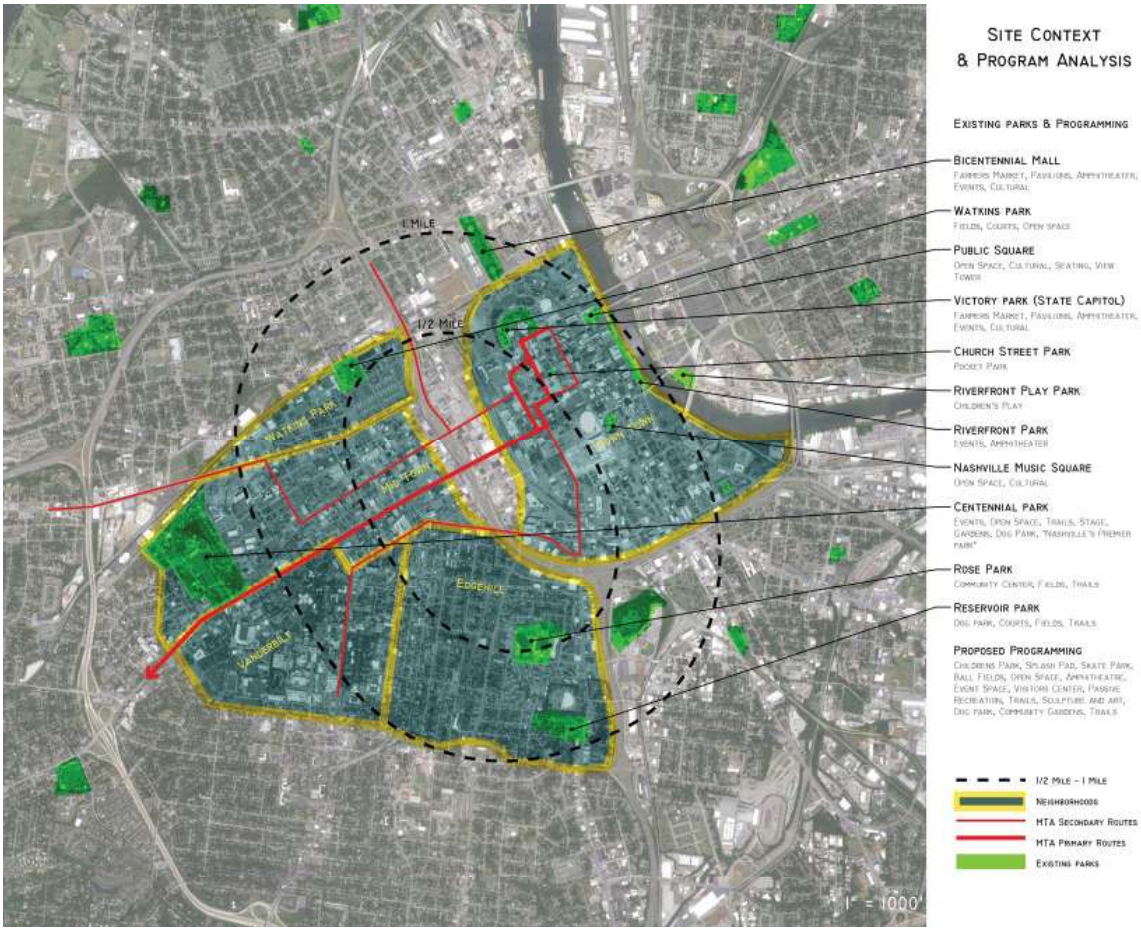


Figure 2.1: Diagram, Nashville Parks and Programming (2012) Source: Michael Payne

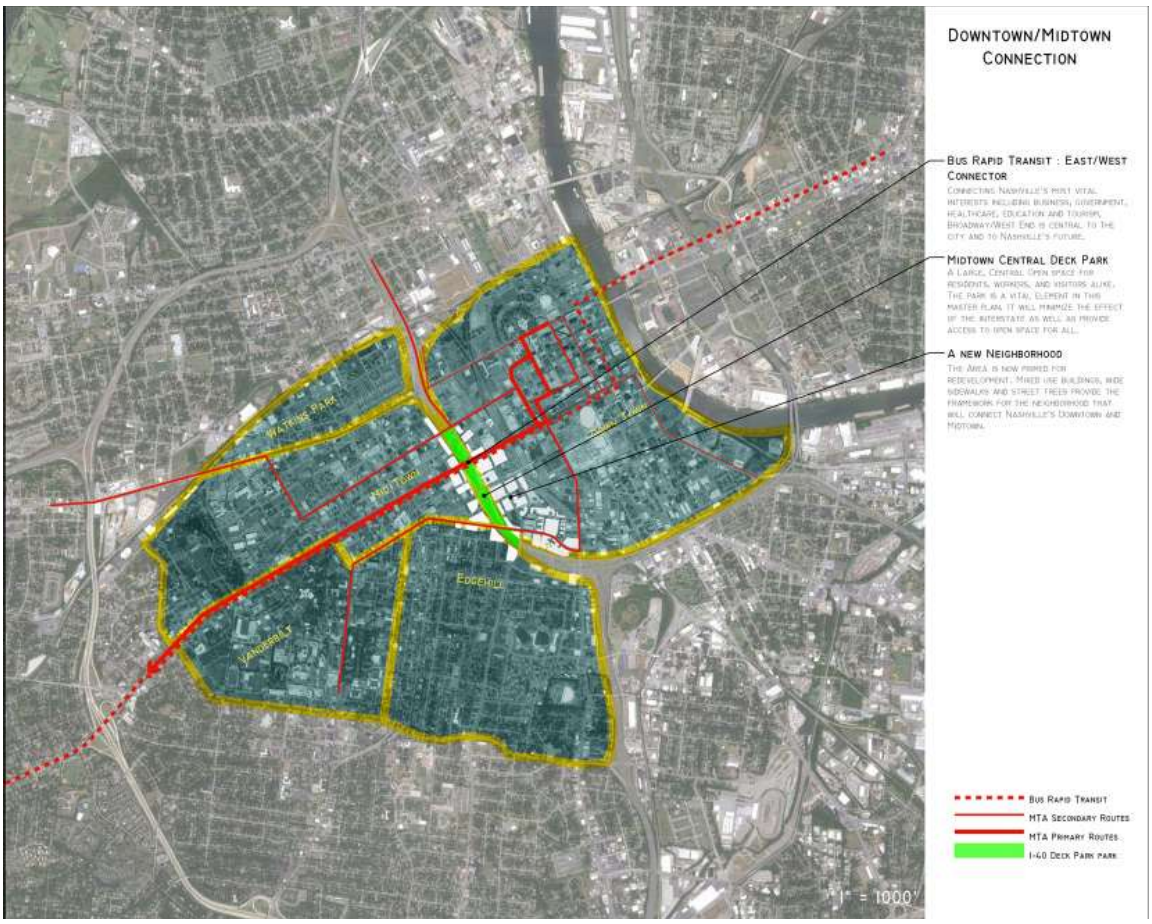


Figure 2.2: Diagram, Nashville Neighborhoods and Conditions (2012) Source: Michael Payne

Qualitative Analysis

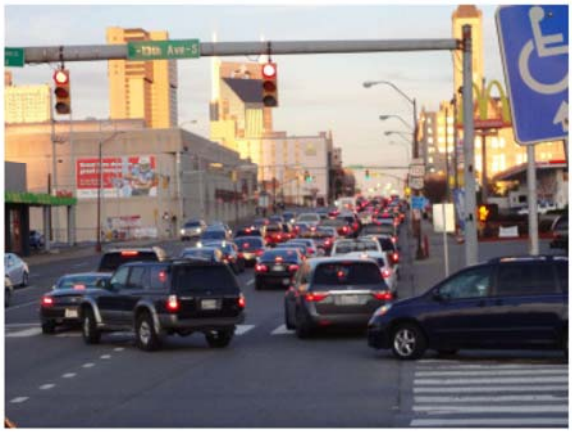
Photo Survey and Site Visits

In order to greater understand and study the site, I made several site visits. These visits were made at various times of day and on various days of the week to gain a greater understanding of pedestrian movement, traffic movement, effects of the interstate, and existing uses of the site. It was also useful in confirming observations made from analysis done in the studio, such as topographical analysis. During these visits, I made a qualitative analysis based on the existing condition. This condition was captured through photographs and are shown in Figure 2.3 - 2.4.

Vacant Lots

Narrow Sidewalks

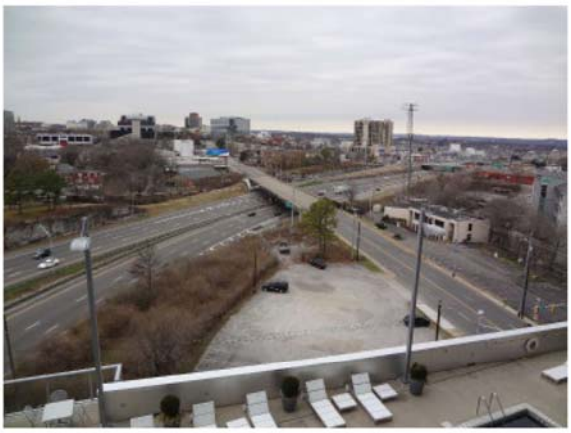
Figure 2.3: Photo Survey (2012) Michael Payne



Rush Hour Traffic, Broadway

View of Downtown, Church Street

Adult Entertainment, Demonbreun St.



Site Overview, The Gulch

Interstate View, Broadway

Typical Interstate Ramp, Broadway

Figure 2.4: Photo Survey (2012) Michael Payne

Physical Analysis

Modeling the Site

I built a physical model of the site. Building the model was useful in two ways. One, the process of constructing the site model yielded a better understanding of the complex topography of the site. It also gave me a better understanding of the network of ramps that provide access to and from the interstate system. The model was built at a scale of 1" = 100' with 8' contours.

Second, it served as a useful tool in quickly explaining and showing the site and the proposed solution. Within moments of viewing the model, one can see the division created by the interstate and the trench that was excavated to facilitate it. I made removable pieces representing the four decks that further enhance the understanding of the solution. Upon completion of the project, I replaced the existing buildings with the proposed ones. This progression can be seen in Figure 2.5.

The site in Section View

Drawing sections of the site was important in ensuring the necessary clearance between the bottom of the deck and the interstate below. Using the topographic AutoCAD map, I was able to cut sections of each deck. Since I knew that each deck would be fixed to its adjoining cross street, this provided me with

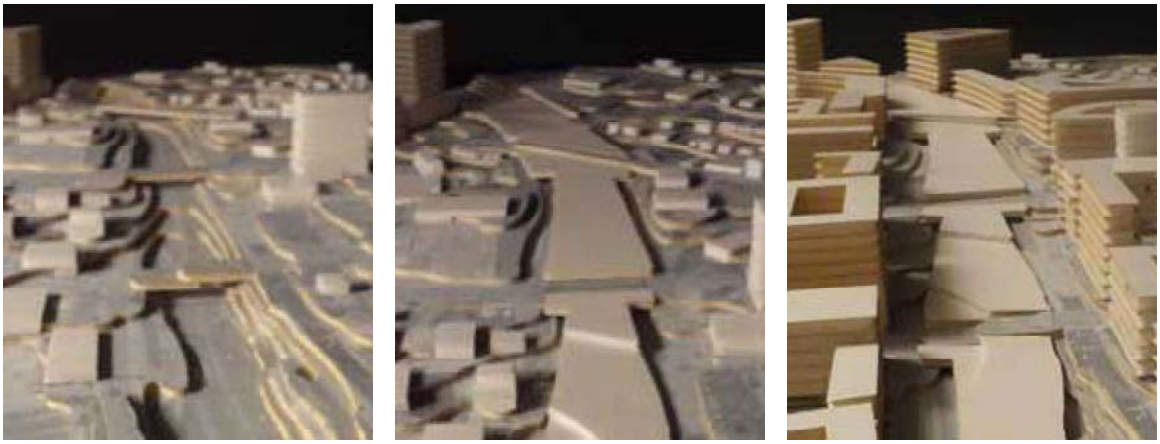


Figure 2.5: Site Model Progression (2012) Source: Michael Payne

the given slope of each deck at that point. The most steeply sloped cross street through the park is Broadway. It has a slope of 6.5% and is shown in Figure 2.6. The other cross streets had much less slope to deal with.

The Site in Plan View

I also conducted a topographical analysis in plan view. My goal here was to make a conceptual grading plan for the proposed park. This would tell me where the park would be on grade with the site and where it would not. This was more difficult than usual because the space I was grading didn't exist. I started with the known points, which were where the cross streets bridged over I-40. From there, I plotted the elevation of the interstate lanes.

The minimum clearance for an urban interstate bridge is 14' according to the American Association of State Highway and Transportation. I added 16' of clearance plus 3' for structure and a minimum of 1' for soil depth for a total of

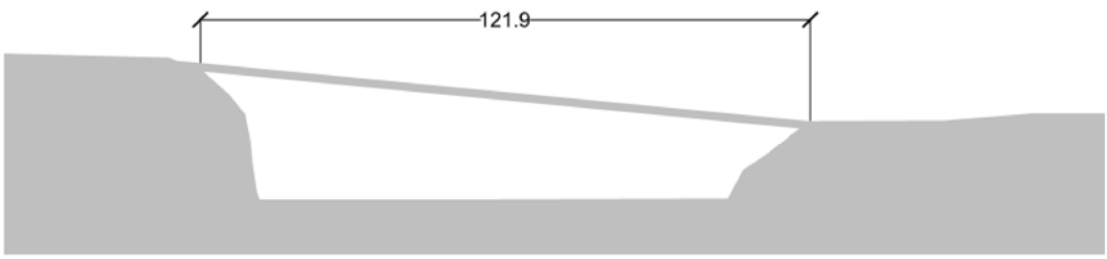


Figure 2.6: Section Drawing, Along Broadway Across I-40 (2012) Source: Michael Payne

20' from the interstate to the top of the deck. With this information, the existing grading plan and the elevation of the fixed points along the cross street bridges over the interstate, I was able to create a conceptual grading plan for the entire deck park. This conceptual grading plan is shown in Figure 2.7. Most importantly, I now know how the deck will interact with the rest of the site. The solid lines bordering each deck represent where the deck is flush with the existing grade. The dashed lines represent where there are vertical differences greater than 2'.

Conditions Diagrams

I drew a series of quick diagrams analyzing the park. These diagrams included a hydrology analysis, a site connectivity analysis, an existing road system and circulation analysis, a pedestrian circulation analysis, and a soil depth analysis. Figure 2.8 shows an example of one of these diagrams. Conclusions from these diagrams would help lead to further design decisions.

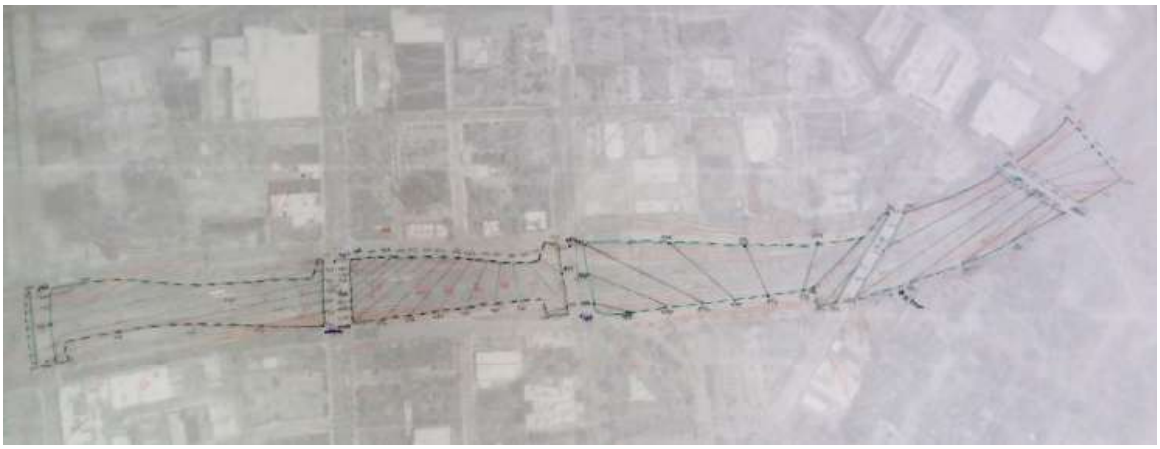


Figure 2.7: Conceptual Grading Plan (2012) Source: Michael Payne

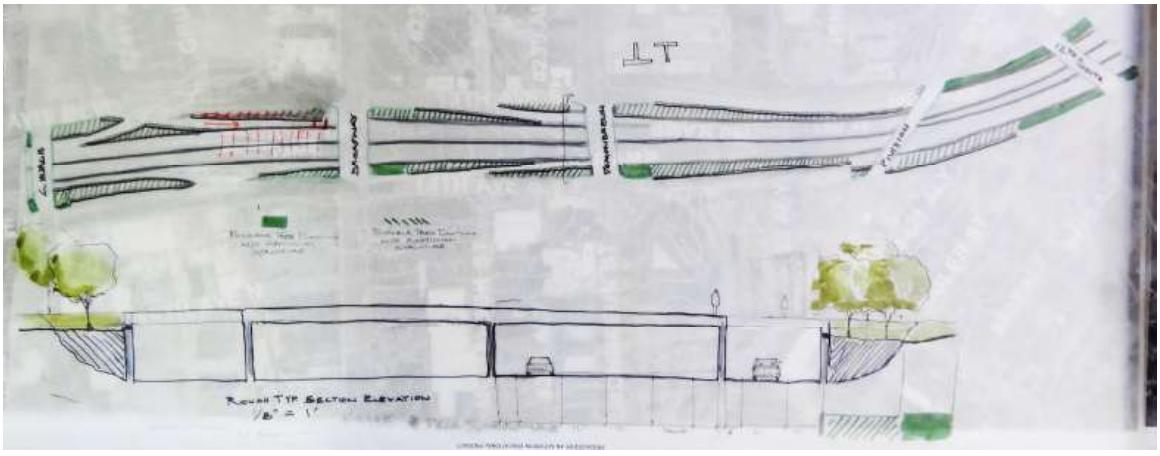


Figure 2.8: Diagram Sketch, Canopy Tree Planting Zones (2012) Source: Michael Payne

These implications include where large canopy trees could potentially be planted, primary pedestrian circulation into the park and its relationship with vehicular circulation routes and possible drainage patterns.

Cedar Glade Visit

During my undergraduate studies in a course 'Native Plants in the Landscape', I studied a plant community at Cedars of Lebanon State Park. Cedars of Lebanon State Park is one of many cedar glades in the Central Basin of Middle Tennessee. Cedar glades are natural woodland openings supporting unique plant communities due to shallow, limestone based soils. Cedar glades are largely unique to the Tennessee Central Basin (MTSU).

Knowing that this deck park would likely have shallow soils in places, I decided to revisit Cedars of Lebanon State Park, primarily for design inspiration. One place that I found inspiring was a natural grass clearing along one of the trails (Figure 2.9). Here a forested trail opens up into a small grass meadow. I thought this might be a way to block out the city in a small section of the park. It inspired me to explore creating some similar meadow and wooded conditions in the park.

Another inspiring condition I observed were in the rock formations. The karst topography creates sinkholes and limestone ridges throughout the park. One of the limestone rock formations I observed went for 300 to 400 feet. The

Figure 2.9: Cedars of Lebanon State Park (2012) Source: Michael Payne

sizes of the stone varied, from 18 to 36 inches off the ground to as high as 6 feet. I sketched the condition in Figure 2.10. The way there were trees and herbaceous plants growing between the rocks was beautiful. This could make an interesting and unique amphitheater or at least seating throughout the park. These rock formations may also inspire 'ledge gardens' in topographic transition zones and fringe areas of the park.

Figure 2.10: Sketch, Cedars of Lebanon State Park (2012) Source: Michael Payne

Planning

Initial master plans were designed using the afore mentioned research and analysis. The street system and building footprints were conceptualized first. Then park master plans were produced using the conditions diagrams. Each of the conditions diagrams were as a focus for each of the initial park master plans produced. For example, figure 2.11 shows an initial master plan based on the hydrology conditions diagram. The process of producing several master plans focusing on different conditions diagrams would eventually lead to the final design solution.

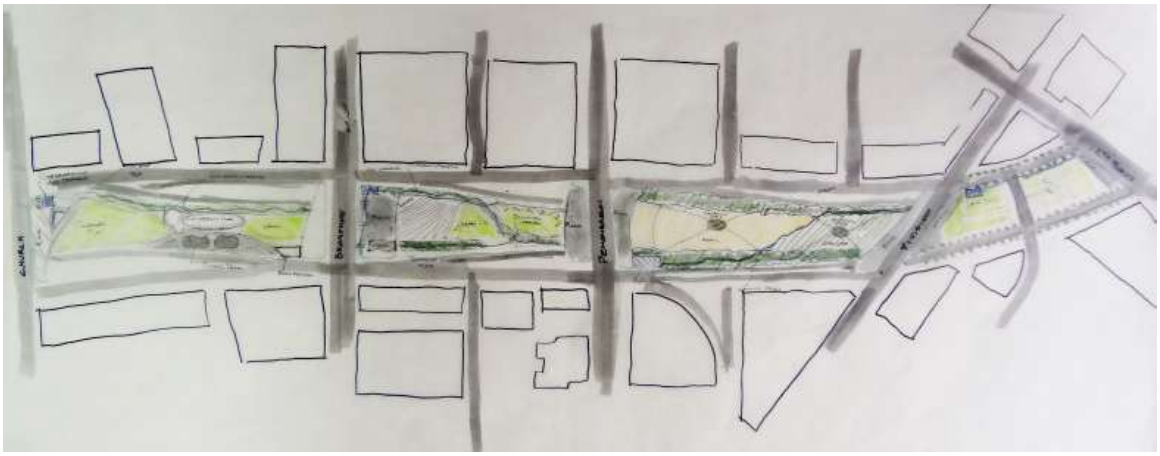


Figure 2.11: Hydrology Based Conceptual Master Plan (2012) Source: Michael Payne

CHAPTER III
PROJECT NARRATIVE

Master Plan

The Surrounding Street System and Buildings

Looking back again at Jane Jacob's assessment on border vacuums, she described them as any large single use sector of land in a city. This includes city parks. I do not simply want to replace one border vacuum with another. However, Jacobs offers a suggestion for avoiding a park becoming a border vacuum. Jacobs suggests addressing the land adjacent to the edge. She suggests that the population density should be made deliberately high in border areas. The surrounding blocks should be of a mix of different uses with small blocks and fluid street use.

Much of this work has already been done for me in The Gulch Master Plan and Erin Gray's design project. By taking these two plans and using them as a base, I was able to make some modifications to form my master plan (Figure 3.1)

Few modifications were needed with the existing street grid. For descriptive purposes, I have divided the four decks on the site as deck I-IV (Figure 3.2) 13th Avenue South and 14th Avenue South were extended along

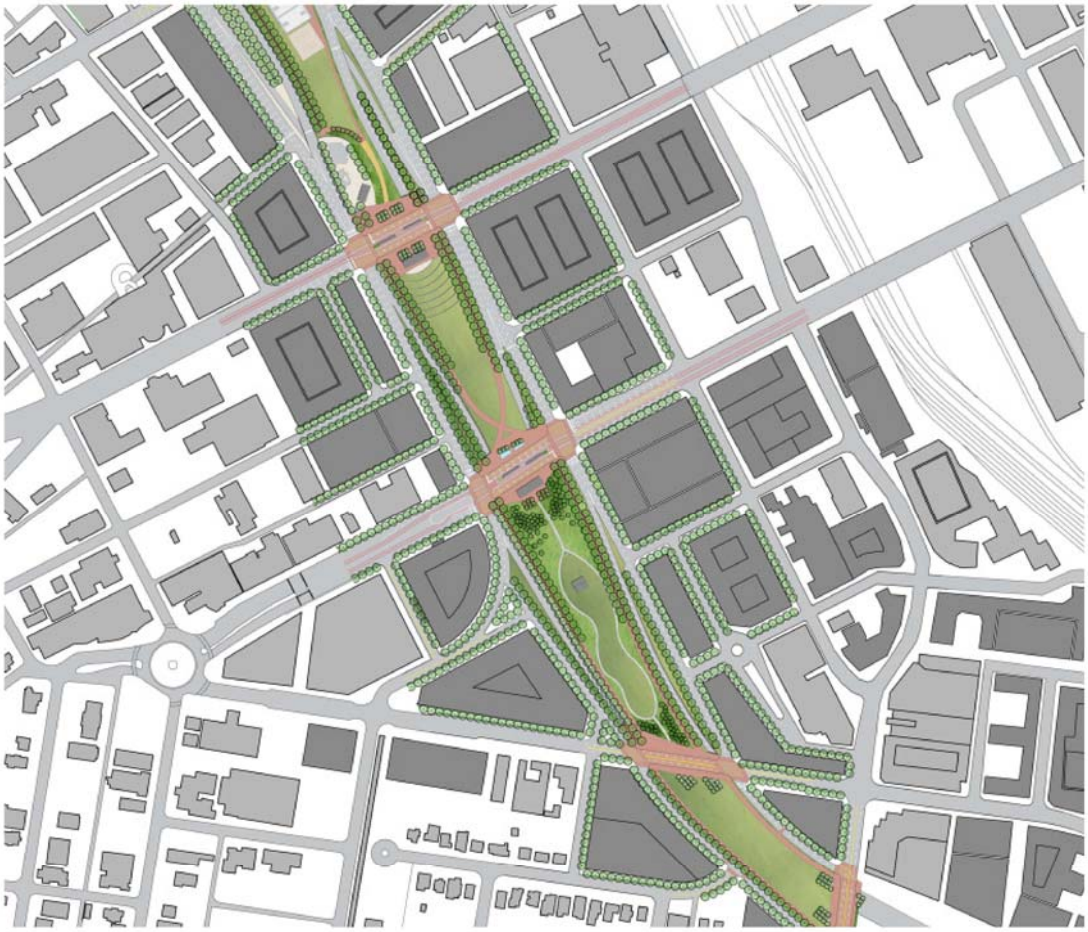


Figure 3.1: Masrer Plan (2012) Source: Michael Payne

Figure 3.2: Diagram, 4 Deck Locations (2012) Source: Michael Payne

deck III and over deck IV. A few of the side streets were extended to meet with 13th and 14th avenues.

The building footprints from the before mentioned master plans were modified to fit the proposed deck park. The overall design of the buildings in the Gulch master plan would of course need to change. As currently planned, they would be facing the interstate. With the decking of the interstate, they will be facing a premier city park.

Street Design

The main purpose of this project is to connect downtown and midtown. One of the key components in achieving this goal is to improve the pedestrian environment through the entire site. The new building footprint introduces sidewalks 15 to 30 feet in width lined with street trees. Paving changes were introduced to calm traffic exiting the interstate. This network of more pedestrian friendly streets will help to connect downtown and midtown. A typical section of the street design is shown in Figure 3.3

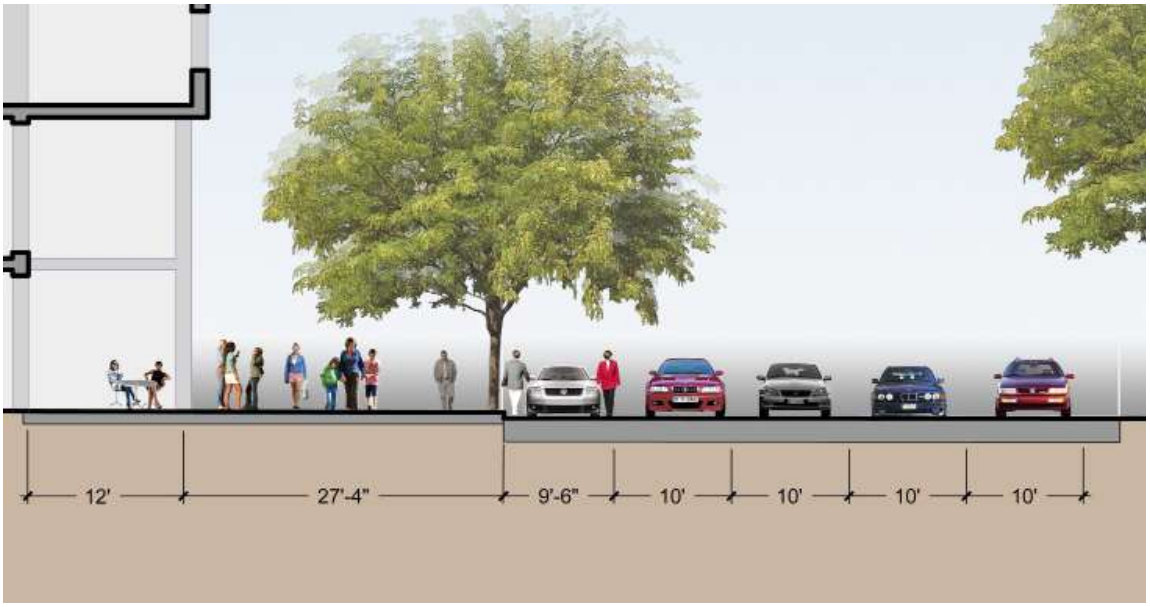


Figure 3.3: 13th Avenue South Street Section (2012) Source: Michael Payne

Final Design

After several more conceptual master plans and critiques from one of my faculty advisors, I finally arrived at a full master plan of the site that would connect downtown and midtown. This neighborhood is a compilation of the analysis and research. It includes the building footprints, street design and park design that together will create a new neighborhood in Nashville as I envision it.

I view the park as the catalyst that will be the centerpiece of this neighborhood. In order for the park to be successful, residents, visitors and employees must want to spend time in this park. In order for the neighborhood to be successful, there must be a park. The park may be built in 4 phases, starting with section II. The decks should be built before or as the surrounding buildings

and streets are built.

Section **I** (Figure 3.4) features a children's splash pad and nature play area. There is an open lawn and skate park allowing for active recreation and, there is a raised boardwalk that runs through a meadow for passive recreation. On the East face of the elevated skate park is a artists mural wall. The skate park would also house bathrooms. Additionally there are basketball courts and volleyball courts to further serve the Watkins Park neighborhood to the North.

Section **II** (Figure 3.5) is the cultural center of the park. With its proximity to Broadway and Deomonbreun, it would be the first phase of the deck construction. The Cafe near Broadway would help to activate the space. There is also an amphitheater. Together, these elements would help to serve as an event space to connect the neighborhood itself. To facilitate this, there are parking spaces for mobile food trucks to park during high traffic times and during events. At the end of the amphitheater is an open lawn leading to a sculpture garden. Pedestrian connectivity through the park is guided by lateral walkways surrounded by canopy trees.

Section **III** (Figure 3.6) was programmed for passive recreation. Each plaza leading into the park goes into a lightly forested cedar glade. Each glade opens into a meadow. Each meadow leads to an open lawn and stone seating. The meadow and lawn can be seen in Figure 3.7. The park is connected by a gravel walking path as well as a grand tree lined walkway similar to the other decks.

Section **IV** (Figure 3.8) is programmed for active recreation. Unlike the

Figure 3.4: Deck I (2012) Source: Michael Payne

Figure 3.5: Deck II (2012) Source: Michael Payne

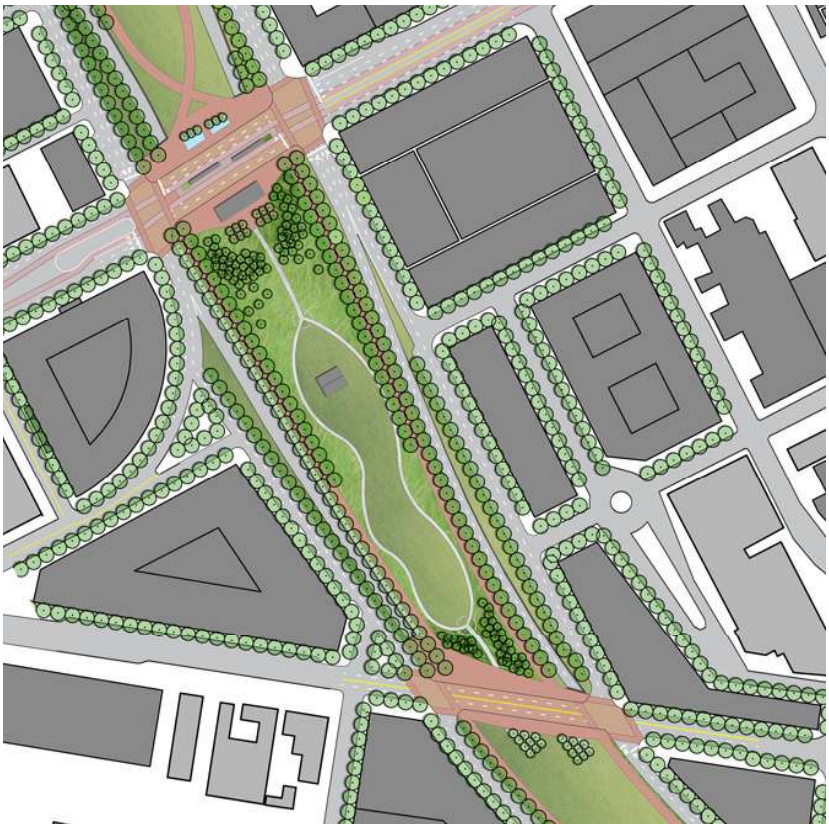


Figure 3.6: Deck III (2012) Source: Michael Payne

Figure 3.7: Glade, Meadow and Lawn (2012) Source: Michael Payne

Figure 3.8: Deck IV (2012) Source: Michael Payne

other decks, pedestrian access is uninterrupted by interstate ramps. The lateral pedestrian walkways continue as do 13th and 14th avenues. In the center is a central lawn space. Community gardens are located at each plaza. There is also a dog park planned on the Southeast corner.

Connectivity Through the Park

One of my concerns with designing a park that was divided into four sections by busy cross streets was with fragmentation. Some critics of the Rose Kennedy Greenway in Boston argue that the park feels fragmented due

to the roads that divide the park (Figure 3.9). One way of dealing with this fragmentation was by the use of long 15 foot wide pedestrian walkways, lined with canopy trees, that would guide users from end to end. Each end of the deck features a small hanging garden with viewing platforms.

Consistent paving and material use throughout the site are another solution. Limestone walls that are common throughout Middle Tennessee and brick paving similar to Second Avenue and Riverfront Park are utilized (Figures 3.10 and 3.11). A consistent planting palette would also help avoid fragmentation of the park. Deck **II** and Deck **III** are very different spaces, but by using consistent materials throughout, they will feel like they are part of a single park. Perhaps the most important piece in preventing a feeling of four separate parks would be the plazas and roads in between each deck.

Figure 3.9: Diagram, Rose Kennedy Greenway, Boston (2012) Source: Michael Payne

Figure 3.10: Paving Material (2012) Source: Michael Payne

Figure 3.11: Limestone Wall (2012) Source: Michael Payne

Plaza Plan

Connectivity Into the Park

As stated before, addressing the fringes of the park will be important in order to avoid the exchange of one border vacuum for another. The roads lining the park have been designed to be dense and of a mixed use. But the interstate ramps that surround the site prevent unrestricted pedestrian access on three of the four deck sections (Figure 3.12). This means that the primary pedestrian entrances at the cross streets will be very important. They will need to calm traffic and invite people through the park. I decided to design one of the plazas in more

Figure 3.12: Interstate Ramps, Nashville (2012) Source: Michael Payne

detail. Figure 3.13 shows the plaza at Broadway.

I propose to use the paving to direct pedestrian traffic and calm automobile traffic. Different colors of brick differentiate the pedestrian zones from the vehicular zones. The Bus Rapid Transit lanes are designated by brick color as well.

Each plaza features two central, leveled and raised seating areas shaded with trees. Each sitting area is placed in relation to the interstate lanes below. The sitting areas in the Broadway plaza are attached to the cafe and visitors center (Figure 3.14). To either side of this building are gathering spaces that also provide seating. At the edges of the deck, parking is provided for food trucks during lunch hour and during events. Behind the building is a stage and amphitheater, as programmed in earlier analysis (Figure 3.15).

Another key component to connectivity lies in the presence of the Bus Rapid Transit Line proposed by Nashville MTA. The proposed line does not currently include a stop at the site. Currently there is no reason for a stop. The proposed master plan includes a BRT stop. This was easy to facilitate. Because of the decking of the interstate, there is an opportunity to widen Broadway and make room for a BRT station without disrupting access to and from the interstate.

Not only is Broadway widened, but the sidewalks that run adjacent to it are widened as well. Raised planted bollards and a planted strip of grasses create a buffer between pedestrians and automobile traffic. These sidewalks through the site will provide better connectivity between midtown and downtown.

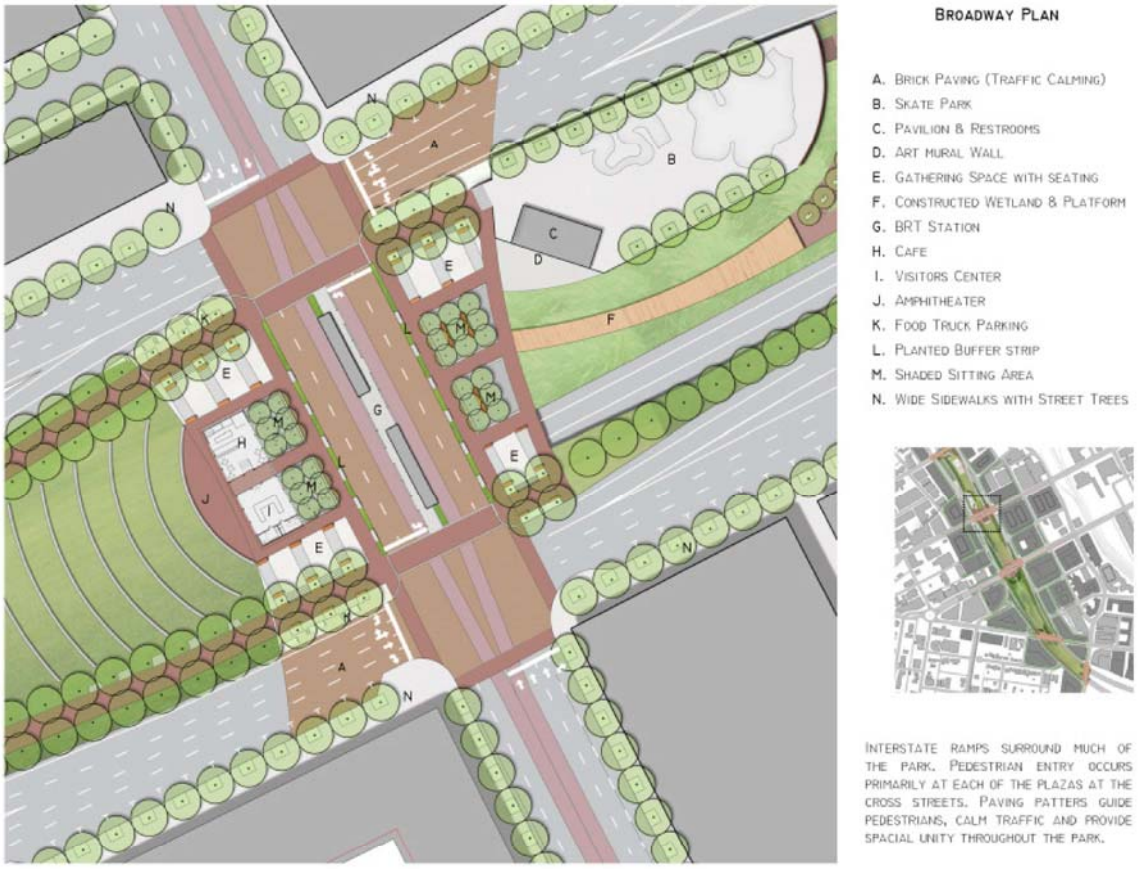


Figure 3.13: Broadway Plaza Plan (2012) Source: Michael Payne

Figure 3.14: Section Elevation through Broadway (2012) Source: Michael Payne

Figure 3.15: Section Elevation through Deck II (2012) Source: Michael Payne

Park Structure

Using the case studies mentioned before, I decided to use poured concrete walls along the edges of the interstate to serve as the beam supports. Concrete walls would also have the ability to retain soil backfill, which could provide deep soil for tree plantings along the fringes of the deck. The concrete walls would also help suppress noise from the interstate. In the center, I planned on using a concrete wall as a beam between lanes of traffic. Since the center is not required to retain any soil, there may be a more economical solution for the center beams.

On top of the beams are bulb T girder structures similar to those proposed for the Hollywood Freeway Central Park in California as well as the Neyland Parking Garage in Knoxville. This decision was based on the needed clearance and weight requirements. Figure 3.16 shows the basic elements of the proposed

Nashville deck structure.

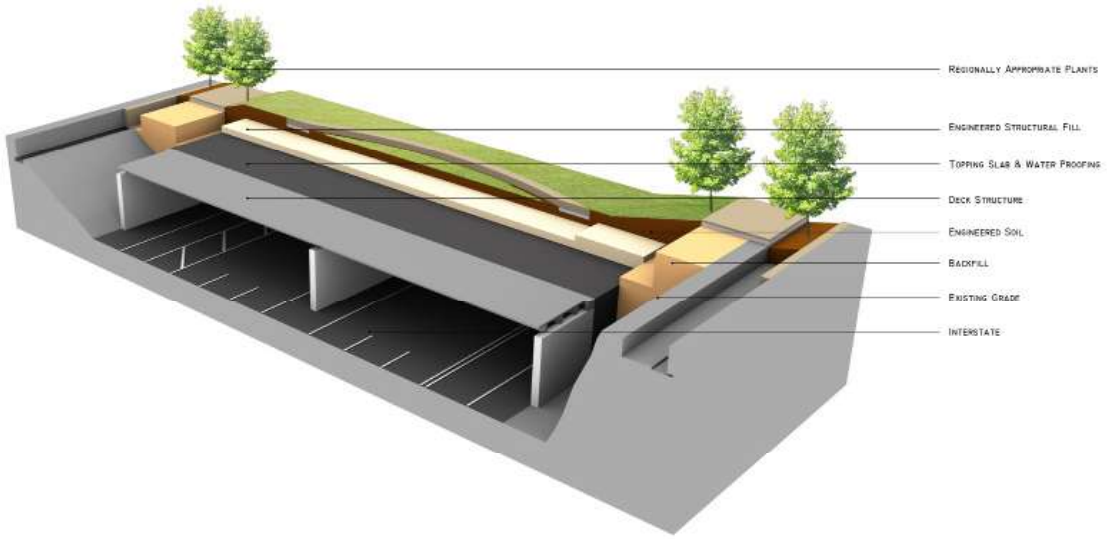


Figure 3.16: Diagram, Nashville Decking Structure (2012) Source: Michael Payne

CHAPTER IV
CONCLUSIONS AND RECOMMENDATIONS

The purpose of this thesis is to test the ability of a freeway park to connect severed neighborhoods. Connecting downtown and midtown in Nashville will take more than a park, it will take an entire neighborhood. Since a successful urban neighborhood needs open space, I believe that the two come hand in hand.

The recent success of The Gulch is proof that the area is appropriate for urban redevelopment. This design project is proof of what The Gulch and beyond could become if the traffic of the interstate could be suppressed and turned into open space. The result would be a new neighborhood where Nashvillians can live, work and play. At the center of this neighborhood is potentially Nashville's premier park.

The main component that dictates a deck park's success is its location. If it is located in a area where open space and connectivity are desired, then it will be successful with even the simplest of designs and amenities. My analysis shows that the chosen location in Nashville is a prime location for redevelopment, starting with the decking of the interstate.

During my defense of this project, I received positive feedback on the

feasibility of the project. The design shows a vision of how to connect Nashville's downtown and midtown. There were design critiques, such as addressing the edges of the park near the interstate ramps. Perhaps I will get to do further design work and analysis on the project as this idea circulates through Nashville.

I believe that the idea of capping Nashville's I-40 south loop to connect downtown and midtown should be further explored. My enthusiasm is based on the success of similar deck parks and the positive reaction that this project has received from those I have shared it with. The proximity the site has to downtown and midtown, along the East/West corridor, make it a prime location for urban redevelopment. Such a project has significant potential for greatly improving this urban area for both mixed use and open space amenity.

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Appendix

Appendix A: Literature Review

The Death and Life of Great American Cities - Jane Jacobs

Jacobs writes on the principles and the aims that shaped modern city planning and rebuilding. The book outlines why different elements of a city have success and why some elements do not. For example, what kinds of city streets are safe and what kinds are not, or why some city parks are marvelous and some are “vice traps and death traps”. The book seems to be an in depth analysis of the city at the ground level.

The most applicable sections of the book are Chapter 14, the Curse of Border Vacuums and Chapter 18, Erosion of Cities or Attrition of Automobiles. Chapter 14 on border vacuums addresses the effects of masses of land with single uses in cities. Examples are parks, large housing projects, waterways and railroads. These single use swaths of land often create “borders” causing “dead spaces” on either side. The borders are created by “vacuums”. Land in the city is divided into two categories as perceived by pedestrians, general land and special land. General land is used for general public circulation by people on foot. This includes streets, small parks, and other public spaces. Special land is not used as pedestrian thoroughfare. It can be built or not, public or private. It is walked around or alongside. The special land and the general land are interdependent on one another. We use the general land to access special land, which may be housing or a hospital. Special land is necessary for a city, but the borders that are

created can cause divisions in city districts when they are too long. Large parks can cause borders when they are large and only used during certain hours. They can become “seams” when night time hours are introduced. Jacobs also argues that large parks can reduce their bordering and vacuum effect by addressing the land adjacent to edge. She suggests that the population density should be made deliberately high in these border areas. The surrounding blocks should also be of a mix of different uses with small blocks and fluid street use.

Interstate: Express Highway Politics, 1941-1956 - Mark H. Rose

This book covers the motives behind the planning and the construction of Highways in the United States. Rose starts with by setting the stage for the post-war highway craze with the increased popularity of the automobile in early part of the century. The book focuses on the period between 1941 until the introduction of the Interstate Highway Act of 1956 by congress. It discusses the promoters of the interstates during this time period. This includes the leaders of trucking firms, planners, farmers, and engineers. The primary motives of were economic growth, faster traffic, and renewed cities.

Rose points to the rise in popularity of the automobile in the early 1900’s. “In 1905, Americans registered about 78,000 vehicles; by 1910, with 485,500 motor vehicle registrations, American was already the leading auto culture in the world. In 1921 alone, Americans purchased 1.6 million vehicles...” By the late 1920’s 55.7% of American families owned a car. This rise in car ownership

allowed families to move from urban areas into the edges of cities and into the suburbs.

Planners of the 1930's believed that highways would hasten traffic flow and help to boost economic development and improve urban life. The head of the Chicago RPA argued in 1940 that, "superhighways offer the opportunity to protect the regional value of the central business area" and "to enhance the values of... decadent areas and help restore them to a tax paying condition." He believed that parks and playgrounds would be inspired by the highways.

During the years of World War II, Highway construction and maintenance was put on hold. Unemployment was reduced as people enlisted and worked in factories contributing to the war effort. This gave planners involved in highway construction several years to plan for postwar projects to offset the expected unemployment after the war. Most of the focus in highway design during the war was based on employment. Several national programs and initiatives were started during this period.

In 1939, president Roosevelt established the Natural Resources Planning Board (NRPB). The chief job of this small board was to raise the standard of living by 50% creating an abundant economy and cooperation between industry, labor and government. Wilfred Owen's ideas were part of this plan. Owen contested many of the programs created in the New Deal. He argued that they were primarily economically driven and "failed to produce results comparable to the best planning and technological methods" In November, 1941 Congress passed the Defense Highway Act. This provided $10 million for highway planning

and surveying for states given that they would match that amount. By 1942, Owen argued that State grants to local officials "ignored traffic requirements" and that sufficient funds were "denied [to] congested metropolitan areas," to be "lavished upon other local roads". Owen proposed a tax system that would concentrate road development to the specific users.

In Chapter 5 Rose addresses the highway and the city. He mentions social critics such as Frank Lloyd Wright, Lewis Mumford, Clarence. S. Brown, Clarence S. Brown, and Benton Mackaye and their utopian plans for regional centers and restyling social relationships but he goes into little detail. He does mention the ideas the Urban planning profession, which consisted mainly of architects, attorneys, engineers and trained planners. Urban planners believed in the neighborhood setting and that sprawl had disrupted it. They also agreed that the urban core was in the most need of help. Most of their plans did include the highway. Freeways were the central feature. Rose points out that much of the though during postwar America pointed to positive effects of the highway in the city. The divisions caused were seen as beneficial. A highway could provide a barrier between residential and industrial. Most thought that highways could "serve the growth and proper social development of urban regions".

He also points out that this was not the case with all planners. Some argued that highways in urban areas accelerated decentralization and lead the destruction of the central business district. For a majority of planners, however, the highway was key to revitalizing the central business district in that it would help bring the convenience of access that suburbanites enjoyed into the city.

The Highway and the City - Lewis Mumford

The first lines of the final chapter of this book seem to sum up Lewis Mumford's feelings about highway construction in postwar America. "When the American people, through their Congress, voted a little while ago (1957) for a twenty-six-billion-dollar highway program, the most charitable thing to assume about this action is that they hadn't the faintest notion of what they were doing. Within the next fifteen years they will doubtless find out; but by that time it will be too late to correct all the damage to our cities and our countryside...". (234) He points to the Americas addiction to the motorcar as a "religion of the motorcar". He makes the argument that the motorcar does not offer the freedom that it promised due to congestion. When few owned automobiles, he who owned one moved as he pleased.

He recognizes the decentralization that highways have encouraged. He uses an example of a person getting in his car to explore the country only to find "another suburb, just as dull as his own". (235) He also points to the large amount of money required to support such a spread out way of life. Schools, libraries, police, and hospitals suffer.

Mumford states the several different purposes for transportation. The first being a means of expanding the motorcar industry. This leads to over employment of the motorcar and more consumption of steel, fuel, and other resources. It also stimulates the economy. This definition has been practiced in the U.S. A second, more appropriate purpose is given as, "to bring people

or goods to places where they are needed, and to concentrate the greatest variety of goods and people, in order to widen the possibility of choice without making it necessary to travel." (236) Another mistake Mumford identifies is the sacrificing of other forms of transportation for the motorcar. He believed that a good transportation policy will focus on all available modes. Each mode has its advantages and disadvantages. "This cannot be achieved by aiming at high speeds or continuous flow alone."(237)

Mumford accuses highway engineers of not learning from past mistakes made from bringing the railroad into dense urban areas. He points to the unpopularity of the elevated railway in New York. It lowered the value of abutting properties even for commercial purposes. The destruction of some of these elevated railways were viewed as triumphs while a similar highway was being built elsewhere in the city at the same time. The trains took the path of least resistance, much like the highways did. Other examples are given where rail blocked pedestrian access to recreation. "Like the railroad, again, the motorway has repeatedly taken possession of the most valuable recreation space the city possesses, not merely by thieving land once dedicated to park uses, but by cutting off easy access to the waterfront parks, and lowering their value for refreshment and repose by introducing the roar of traffic and the bad odor of exhausts, though both noise and carbon monoxide are inimical to health" (241)

Metro Green: Connecting Open Space in North American Cities - Donna Erickson

Donna Erickson's book is primarily about connecting open spaces in America, and not specifically about the necessity of parks in cities. In the first chapter, however, she does go into the importance of open space in cities. The argument is made that one of the reasons for sprawling development is due to a lack of open space in urban areas. Much credit is given to the public awareness concerning the necessity of open space to what she calls the "smart growth movement". (4) She credits planners, landscape architects, environmentalists, and park planners for being advocates of open space before it was "on the front page" just two decades ago.

She backs this awareness with some statistics. "A study in Leuven, Belgium showed that 50% of families that moved out of the city core did so because of lack of greenspace". "78 percent of all American homebuyers rated open space as essential or very important. Another national survey in 1994 found that among people who shopped for or bought a home, of thirty-nine features critical to their , consumers ranked"lots of natural open space" and plenty of "walking and biking paths" as the second- and third-highest-rated aspects affecting their choices."

Erickson uses The Preliminary Blueprint for Renewal, a plan for Lower Manhattan after September 11th as an example. "Open spaces are essential to the quality of life downtown, providing alternatives to steel and glass skyscrapers and, perhaps more importantly, a physical and psychological center around which

the city can grow. Public open spaces stimulate and promote private and human development"

Urban Open Spaces - Helen Woolley

Woolley's book is dedicated to the importance of open spaces in an urban environment. The book is divided into three sections. The first section identifies the benefits of open spaces. The second section goes into different typologies of open spaces, from domestic, to neighborhood to civic. The third section features case studies from around Great Britain.

Woolley starts by describing the population trend in the last century moving from rural to urban environment. Statistics such as, "It is expected that by the year 2025 half of the global population, anticipated at some three billion people, will be living in cities". She continues to identify the term "open space". There are several different definitions given. One is basically any undeveloped land in an urban area. Others include not only the land, but the water that flows through the space and the air and light that are above the space. Cranz describes urban open space as "wide open areas that can be fluid to the extent that the city can flow into the park and the park can flow into the city".

The first section, which focuses on the importance of urban open space, is divided into four chapters. Each chapter directly pertains to this thesis paper, for urban open space must be considered very important to justify building over an interstate in order to create it. Chapter one concerns social benefits and

opportunities that open space provides. These include children's play as well as passive and active recreation.

The section on children's play is important in that in order for families to consider living in urban environments, there must be spaces for their children to play in. Play is widely accepted as one of the most important activities to develop social skills in children. The book points to numerous studies that confirm this. The type of environment needed by children to exercise these skills varies greatly depending on the age of the child. An entire book could be written on that subject alone.

Passive and Active recreation is another important opportunity available to the users of public space. Passive recreational activities include watching wildlife or people, taking in views, reading, socializing, or resting. A study by the Office of the Deputy Prime Minister discovered that more people us urban open space for passive reasons that for events or for active reasons. Active recreational activities include playing soccer or football, jogging or throwing a Frisbee. Open space has an important role to play as a venue for both active and passive activities.

Chapter two emphasizes the health benefits associated with urban open spaces. Many are linked to physical activity, as mentioned in chapter one. Open spaces provide a venue for these activities that may otherwise be unavailable. Children's health related to diet and activity in Britain is apparently as much an issue there as it is with our children here in the United States. The mental health benefits connected to open space are also important. Natural setting serve as a setting for recovery from fatigue and meditation.

Environmental benefits associated to open spaces include reduction of air temperature and pollution as well as noise pollution. Trees are one of the main reasons for this. This subject, like many in the book, is only skimmed. Woolley uses the term ‘park cool island’ effect versus the term ‘heat island effect’. Trees are also linked to the reduction of noise pollution. Studies show that there are many variables included with trees ability to reduce noise. One, trees cannot reduce a great level of noise unless the barrier of trees is very wide. Second, the ambient sound created by the rustling of leaves is effective in drowning out the unwanted noise. Finally, there is a visual link to making out noise. Trees often serve as a visual barrier to a noise source. If people cannot see the source of noise then they are often much less conscious of it. The type of noise and the type of trees used also determine the effectiveness of the trees ability to obstruct noise.

Vita

Michael J. Payne was born in 1981 to Mike and Jeneanne Payne. He was raised in Nashville, TN. He attended high school at Goodpasture Christian School. In 2005 he received his B.S. in Plant Sciences and Landscape Systems. He worked as a landscape designer for three years before earning his Masters in Landscape Architecture in 2012.